

Patent Claims

1. Optical sensor element (10), in which there is a light sensitive area (18) in a semiconductor substrate (1), in which by illumination charge carriers are releasable, and two doping zones (15, 16) for receiving charge carriers released from the light sensitive area (18), as well as an electrode (13, 14) insulated against the light sensitive area (18) for production of a field gradient in the light sensitive area (18), thereby characterized, that the insulated electrodes (13, 14) are provided in grooves formed in the surface of the substrate (1).
2. Optical sensor element according to Claim 1, thereby characterized, that each doping zone (15, 16) contacts one insulation layer (12) of one of the insulated electrodes (13, 14).
3. Optical sensor element according to Claim 1 or 2, thereby characterized, that at each doping zone (15, 16) an ohmic contact is formed.
4. Optical sensor element according to one of the preceding Claims, thereby characterized, that the depth of the grooves is greater than the thickness of the doping zones (15, 16).
5. Optical sensor element according to one of the preceding Claims, thereby characterized, that the depth of the grooves is between 5 and 40 μm , preferably between 2 and 25 μm deep.

6. Optical sensor element according to one of the preceding Claims, thereby characterized, that each doping zone (15, 16) is associated with a collection condenser for collection of charge carriers extracted from the doping zone (15, 16).
7. Optical sensor element according to Claim 6, thereby characterized, that each collector condenser includes two conductive plates, which are provided in the grooves of the substrate.
8. Optical sensor element according to one of the preceding Claims, thereby characterized, that in place of insulated electrodes (13, 14) of metal semiconductors structures (31), built up electrodes are present, which form Schottky barriers (30) adjacent to the light sensitive area (18).
9. Optical sensor element according to Claim 8, thereby characterized, that the sensor element does not include any doping zones (15, 16).
10. Optical sensor element according to one of the preceding Claims, thereby characterized, that on the surface of the light sensitive area (18) an ohmic p⁺-contact (32) is diffused in.
11. Optical sensor array with a plurality of sensors according to one of the preceding Claims, thereby characterized, that respectively two sensor elements (10) adjacent in a first

direction are provided on two sides of a common insulated electrode (13').

12. Optical sensor array according to Claim 11, thereby characterized, that the common insulated electrode (13') bordering doping zones (15, 16) of the two sensor elements (10) are connected electrically conductively.
13. Optical sensor array according to Claim 12, thereby characterized, that the two sensor elements (10) are joined or combined into a pixel.
14. Optical sensor array according to Claim 11, thereby characterized, that the doping zones (15, 16) bordering the common insulated electrode (13') of the two sensor elements (10, 10') are insulated electrically from each other.
15. Optical sensor array according to Claim 14, thereby characterized, that the insulating layer (12) of one of the insulated electrodes (13, 14) is thicker at the floor (26) of its groove than at its side walls (27).
16. Optical sensor array with a plurality of sensors according to one of Claims 1 through 7, thereby characterized, that in between each other adjacent insulated electrodes (13, 14) of two in a first direction adjacent sensor elements (10) one of the electrodes (13, 14) is formed of against each other insulating zone (28) (?).

17. Optical sensor array according to Claim 16, thereby characterized, that the insulating zone (28) is formed by the semiconductor substrate (1) or a groove.